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Fixing member for a bicycle drive device

The present invention relates to a universal fixing member for a device for ~~the friction~~ driving of a bicycle wheel.

Driving systems for bicycles offer assistance for pedalling by means of an additional motor. This assistance generally consists of a drive mechanism arranged on one of the wheels of the bicycle. Thus the power of the motor drives the wheel and is added to the power exerted by the pressure on the pedals, which enables the cyclist to supply less effort.

~~Such a drive system, for example, is illustrated in European patent application EP A 0 155 185. This known system is provided with a drive motor connected to one of the wheels of the bicycle by means of a drive wheel. In this drive system, the member fixing the drive device comprises a fastener to be connected to an element of the bicycle frame, the drive device being arranged so as to be able to pivot about a pin provided on this fastener.~~

~~Unfortunately, the majority of these drive systems are fixed to the bicycle frame permanently, that is to say non-adaptively. The known fixing system, being provided for a particular type of configuration, adapt only with great difficulty to another type of configuration. Thus, when a cyclist wishes to change a bicycle for another bicycle having a different configuration or simply wishes to modify the position of the drive system on his bicycle, he must very often change the fixing system or change drive system. Unlike the drive system illustrated in European Patent application EP-A-0.155.185, in addition to the familiar drive system the new invention introduces a technological innovation as regards the fixing of the drive device. The fixing member of the drive device comprises a single mounting connecting this element either, in the case of a bicycle, to the seat post or to the handlebars, or to the frame of another non-motorised vehicle. The said system is thus different since rather than being fixed permanently or in a non-adjustable manner to the frame of a non-motorised vehicle, this case provides a truly universe system.~~

The aim of the present invention is therefore to propose a member for fixing a device for driving a bicycle wheel ~~by friction~~, adapting easily to each type of conventional bicycle vehicle.

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This aim is achieved by ~~a~~this member for fixing a device for driving a ~~bicycle wheel by friction~~, comprising

~~-a single fastener(7) connected to an element of the bicycle frame either to the handlebars or the foot of the saddle, or to the frame of any bicycle or vehicle to be powered.~~

~~-the friction drive device being arranged so as to be able to pivot freely about a first pivot pin an axis of the pivot(4),~~

this fixing member also comprising

~~-a first part (2), to which the drive device is connected so as to be able to pivot freely about the said first a pivot pin axis of the pivot (4) ,~~

~~-a second part (5), which is connected to the first part so as to allow mutual pivoting adjusting between them about an second pivot pin, and which comprises the said fastener, at a distance from the said second pivot pin, and together using two locking screws (19), the latter thus not being involved in the rotation of the power unit towards the wheel to be driven~~

~~-adjustment means capable of detachably fixing the first part with respect to the second part in an angular position adjustable by the above mentioned mutual pivoting.~~

Thus the drive device does not pivot directly with respect to the bicycle frame or to a part fixed with respect to this frame, but on the contrary with respect to an intermediate piece, referred to as the first part of the fixing member, whose angular position with respect to the second part can be adjusted in advance. ~~In this way, the drive device can adapt to the movement of the wheel with respect to the bicycle frame, in particular when it is damped. The fixing member can be adapted by simple pivoting to the configuration of the frame, for example at the position of the fastener point or at that of the drive device.~~

In conclusion, the drive device comprises both a preliminary adjustment system for a given vehicle and a system for putting it in contact with the wheel to be driven.

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~~According to one embodiment of the invention, the first pivot pin is situated at a distance from the second pivot pin. Advantageously, the fixing member comprises means of modifying the separation between the first pivot pin and the second pivot pin. Preferentially, the first part has several pivot seats for adjusting the position of the first pivot pin as required. In this way, very easy adjustment is obtained which is particularly adaptable to any model of bicycle and to any position of the frame for the fixing member and therefore the drive device.~~

~~According to another embodiment, the fixing member can comprise at least one stop arranged so as to delimit an angle of movement between the said drive device and the said first part. The angle of movement thus delimited reduces the risk of the drive device jumping when disconnecting from the wheel. Following its passage over an irregularity in the road, the drive device may bounce on the bicycle tyre and tilt about the first pivot point. The invention can be executed in at least three possible forms, namely:~~

~~For the first (figure 1), a sliding axle (19) in two curved slots (17) allowing widely variable adjustment of the two components of the universal arm (2) and (5) to a given angle.~~

~~For the second (figure 7), adjustment in fixed steps, determined by a series of holes arranged in an arc of a circle allowing a finite number of settings which are however more suitable for severe conditions.~~

~~For the third (figure 4), adjustment using a kneepiece for which the connection between parts (26) and (27) is executed using notches to be screw-fastened (6), supplemented by an extension comprising two elements of which one slides into the other and is set using a tightening pivot (25) which, as appropriate, will slide into the slots (24) or lodge in one of the locating holes which could be used instead of the slots referred to above.~~

Other embodiments of modular structures according to the invention are indicated in the accompanying claims. In addition, other details and particularities of the invention will emerge from the description given below, non-limitingly and with reference to the accompanying drawings.

In the drawings:

FIG. 1 is a schematic perspective view of an embodiment of a fixing member according to the invention.

FIG. 2 illustrates, in a side view, a fixing member according to the invention fixed to a first type of bicycle.

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FIG. 3 illustrates, in a side view, the fixing member according to FIG. 2 fixed to a second type of bicycle.

FIG. 4 is a perspective view of the first and second parts of a variant fixing member according to the invention.

FIG. 5 is a plan view of the connection between the two parts of the fixing member according to FIG. 4.

FIG. 6 depicts a side view of a detail of the construction of a variant second part of the fixing member.

FIG. 7 is a side view of yet another variant fixing member according to the invention.

In the drawings, the same reference number has been allocated to the same element or to a similar element.

If reference is made to FIG. 1, the fixing member (1) comprises a first part (2) connected to the drive device (3) so as to be able to pivot about ~~a first pivot pin~~ an axis of the pivot (4). In addition, a second part (5) is attached to the first part (2), so as to allow their mutual pivoting adjusting about ~~a second pivot pin~~ an adjusting and locking pivot (6). The second part also comprises a fastener (7) situated at a predetermined distance from ~~the said second pivot pin~~ the adjusting and locking pivot (6).

This fastener (7) can comprise, for example, two blocks (8), the first block comprising a concave face (9) placed facing the concave face of the second block, and these blocks being connected by fixing means such as, for example, clamping screws (10). One of the blocks can be integral with the second part of the fixing member.

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In order to fix the fastener to a part of the handlebars, the operator can unscrew the clamping screws so as to separate the two blocks and place the block integral with the second part against the part of the bicycle to which the fixing member is fixed. Next, the operator can place the other block opposite and screw the clamping screws so as to fix the two blocks around the part of the handlebars. Likewise, the form of the sides of the blocks coming into contact with the bicycle can vary so as best to follow the circumferences of the place to which the fastener will be fixed.

It can also be imagined that the fastener can itself be connected detachably to the second part (5) of the fixing member. It can also be conceived, for example, that, as illustrated in FIG. 7 6, the fastener be supported on the second part (5) by a pivot (29), for adapting the position of the fastener in the most appropriate fashion to the frame element to which the fixing member must be attached. In the embodiment illustrated, the pivot (29) is formed by one of the clamping bolts of the fastener (7).

In the embodiment illustrated in FIGS. 1 to 3, the drive device is composed of a motor (21), for example electric, connected to a drive wheel by a transmission means, not shown, such as a chain or belt, the drive wheel acting on the bicycle tyre by communicating its movement to it ~~by friction.~~

~~According to another embodiment of the invention, the first and second pivot pins can be coaxial along the rear edge of the drive device. Thus a single pin could serve as a pivot for the movement between the drive device and the assembly consisting of the first and second parts. This embodiment could prove to be more economical in manufacture.~~

In addition, the first part (2) of the fixing member can comprise a series of holes (12) close to the drive device. These holes represent various pivot seats or the swinging mounting, and for a system described in detail in patent EP 1593593. They allow an additional adjustment for the placing of the drive device. This is because these holes make it possible to modify the location of the first pivot pin axis of the pivot (4) so that the driving device can be positioned optimally, and therefore

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~~adjust the length between the fastener and the drive device so as to place the drive wheel on the bicycle tyre as advantageously as possible according to the bicycle configuration (see for example the various positions illustrated in FIGS. 2 and 3).~~

~~In addition, the fixing member can also comprise at least one stop arranged so as to delimit an angle of movement between the said drive device and the said first part. In the embodiment illustrated in FIG. 1 the fixing member comprises two stops, the first stop 13 being one of the actual sides of the first part 2 of the fixing member and the second stop 15 being situated on the other side of the fixing member.~~

~~Thus, when the drive device bounces, for example following a bump encountered by the wheel, it tilts about the first pivot pin 4, so as to be stopped by the first stop 13. In this case, in fact, during rotation about the first rotation axis, the shell 14 of the drive device encounters the side 13 which stops it in its rotation movement and enable the drive device to fall again towards the wheel by gravity.~~

~~Likewise, The fixing member can also be provided with a normal elastic means, not shown, which, with a certain degree of freedom, forces the drive device to remain essentially in contact with the wheel.~~

~~The second stop 15 enables the drive device, when the wheel is squashed or gives way violently under the drive device, to be stopped at a certain movement angle so that, when the wheel returns to its initial position, the drive device does not encounter the wheel too violently. For example, if the inclination of the drive device with respect to the movement axis of the wheel were 90[deg.] or more, the encounter between the wheel and the drive device could cause high forces in the first pivot pin which could twist or break it.~~

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In addition, in FIGS. 1 to 3, the fixing member also comprises adjustment means (16) which comprise, on one of the parts of the fixing member, for example on the second part (5), at least one first orifice (17) extending in an arc of curvature having as its centre the second pivot pin adjusting and locking pivot (6) and a second orifice (18), for example situated on the first part (2) of the fixing member. ~~This second orifice 18 is arranged so as to move opposite one of the said at least one first orifice 17.~~ In addition, a holding and clamping means is arranged so as to engage in the first orifice (17) and in the second orifice (18) in order thus to keep the two parts integral with each other, after clamping. In this case, the holding means (19) comprise a nut and a bolt, a screw, a brace, two washers, and a self-locking nut.

As illustrated in FIGS. 2 and 3, the fixing member can adapt to various bicycle configurations. Thus, as depicted in FIG. 2, the fixing member makes it possible to attach the drive device to a substantially vertical bar of the bicycle any form of handlebars or seat post of a bicycle or on part of the frame of another vehicle. It is also possible, as depicted in FIG. 3, to attach the fixing member to a substantially horizontal bar of the bicycle, onto handlebars, regardless of their configuration.

So as to adjust the pivot angle of the first part with respect to the second, the ~~eyelist user~~ makes the second part (5) and the first part (2) of the fixing member pivot mutually about the second pivot pin adjusting and locking pivot (6). Next, in the appropriate angular position, the fixing means (19), in this case a nut and a bolt a screw, are tightened ~~so as to press the first part onto the second, which fixes these two parts together.~~ in such a way that the first part is pressed against the second, thus fixing them solidly.

In addition, the drive device can comprise a shell provided with a luggage holder (20), the luggage holder preferably being arranged so as to carry a bag deposited so as to straddle the luggage holder. The bag can comprise ~~for example~~ also two locations, each arranged to contain for example batteries supplying the motor of the drive device. When the bag is placed straddling the luggage holder, the batteries will be placed so as to balance the weight on each side of the drive device.

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In the example embodiment illustrated in FIG. 4, the first part (2), also consists of two pieces (22) and (23) capable of sliding with respect to each other, ~~for example telescopically~~. The first piece 22 is hollow and supports either the drive device (3), or the patent EP1593593 enabling it to pivot about the pin axis (4). The second piece (23) slides inside the first piece (22) and is connected to the second part (5) so as to allow mutual pivoting-adjusting. Through the elongate slots (24) of the second piece (23), ~~a clamping bolt~~ a clamping screw (25) supported by the first piece (22) can be passed and tightened. When the separation between ~~two pivot pins 4 and 6~~ the axis of pivot (4) and the adjusting and locking pivot (6) is appropriate, ~~the bolt~~ the screw (25) can be tightened in order to lock the two pieces in this position.

The first part (2) has at one end a circular serration (26) whose centre is formed by the ~~pin~~ adjusting and locking pivot (6). Likewise the same part (5) has a corresponding serration (27) whose centre is also formed by the ~~pin~~ adjusting and locking pivot (6). When the two parts (2) and (5) have acquired their appropriate angular position a clamping bolt passing through the ~~pin~~ adjusting and locking pivot (6) is tightened and the serrations engage in each other and cooperate so as to lock the two parts together.

FIG. 8 7 also depicts another embodiment of a fixing member. Around the pin adjusting and locking pivot (6), each of the parts has orifices which extend in equal arcs of a circle concentric with the pin. It is thus possible, by means of ~~a clamping bolt~~ a clamping screw, to fix the mutual angular positions of the two parts of the fixing member.

It must be understood that the present invention is in no way limited to the embodiments described above and that many modifications can be made thereto without departing from the scope of the accompanying claims.

It is possible in particular to imagine, between the first part and the second part of the device, a combination, not illustrated, of a first part (2), of the telescopic type similar to that illustrated in FIG. 4, and a second part (5) with rotary adjustment similar to that illustrated in FIG. 7.



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It is also possible to conceive, as illustrated in broken lines in FIG. 7, an embodiment of the second part (5) where the fastener (7) supports an intermediate element (28) in an angularly adjustable manner.

~~It is also possible to make provision for the axis of the motor 21 to be the axis of the wheel 11.~~